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Dr. Middleton PHYS 132 HW

3-27-17

Ch.32

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P. 10,13,14

Problems

32.P.10

$\vec{B} = 0.10\,T$

$d = 3.0 \times 10^{-3}\,m$

$r = 1.6 \times 10^{-2}$

I ?

$B = \frac{\mu_0 I}{2\pi r}$

$\frac{2\pi B r}{\mu_0} = I$

$\mu_0 = 4\pi \times 10^{-7}$

$B = 0.10\,T$

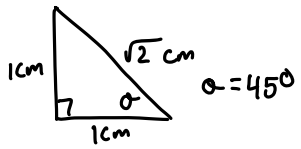
$r = 3.0 \times 10^{-3}\,m$

$I = 750\,A$

$I = 750\,A$

32.P.13 $I = 10\,A$

a.) (0cm, 0cm)
b.) (1cm, 0cm)
C.) (2cm, 0cm)



a.) $B_{wire} = \frac{\mu_0 I}{2\pi d}$

a = c due to symmetry

$\mu_0 = 4\pi \times 10^{-7}$
$R = 0.01m$
$Z = \sqrt{2} \times 10^{-2} m$
$I = 10\,A$

$\frac{\mu_0 I}{2\pi d}(\cos\theta + \sin\theta) + \frac{\mu_0 I}{2\pi d}(\cos\theta - \sin\theta)$

$\frac{\mu_0 I}{\pi d}(\cos\theta + \sin\theta + \cos\theta - \sin\theta)$

$\frac{\mu_0 I}{\pi d}(\cos\theta)$

$\frac{(4\pi \times 10^{-7})}{\pi(\sqrt{2} \times 10^{-2}m)} \cos 45 = 2.0 \times 10^{-4} T$

a.) $B = 2.0 \times 10^{-4} T \uparrow$
b.) $B = 2.83 \times 10^{-4} T\, \hat{j}$
C.) $B = 2.0 \times 10^{-4} T \uparrow$

b.) $B_{wire} = \frac{\mu_0 I}{2\pi d}$

$B_B = B_{Top} + B_{Bot}$

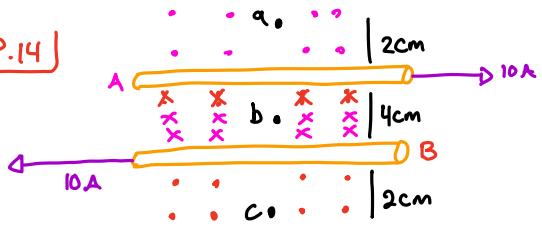
$\mu_0 = 4\pi \times 10^{-7}$
$I = 10A$
$d = \sqrt{2} \times 10^{-2} m$

$B_T: \frac{\mu_0 I}{2\pi d} = \frac{(4\pi \times 10^{-7})(10A)}{2\pi(\sqrt{2} \times 10^{-2} m)} = 1.41 \times 10^{-4}\, T$

$B_B: \frac{\mu_0 I}{2\pi d} = \frac{(4\pi \times 10^{-7})(10A)}{2\pi(\sqrt{2} \times 10^{-2} m)} = 1.41 \times 10^{-4}\, T$

$B_T + B_B = 2.83 \times 10^{-4} T$

32.P.14



a=c due to symmetry

a.) $B_{wire} = \frac{\mu_0 I}{2\pi d}$

$B_a = B_A + B_B$: $\frac{\mu_0 I}{2\pi d_1} - \frac{\mu_0 I}{2\pi d_2} = \frac{\mu_0 I}{2\pi}\left(\frac{1}{d_1} - \frac{1}{d_2}\right)$

$\mu_0 = 4\pi \times 10^{-7}$
$I = 10A$
$d_1 = 0.02m$
$d_2 = 0.06m$

$\vec{B}_a = 6.67 \times 10^{-5}\ T\ \hat{k}$

$B_a = 6.67\times10^{-5} T\,\hat{k}$
$B_b = -4.0\times10^{-5} T\,\hat{k}$
$B_c = 6.67\times10^{-5} T\,\hat{k}$

b.) $B_{wire} = \frac{\mu_0 I}{2\pi d}$

$B_B = B_b + B_c$: $-\frac{\mu_0 I}{2\pi d_c} - \frac{\mu_0 I}{2\pi d_b}$

$\mu_0 = 4\pi \times 10^{-7}$
$I = 10A$
$d_b = 0.02m$
$d_c = 0.02m$

$-\frac{\mu_0 I}{\pi}\left(\frac{1}{d_c} + \frac{1}{d_b}\right) = -4.0\times10^{-4}\,\hat{k}\ T$

$\vec{B}_b = 4.0\times10^{-4}\,\hat{k}\ T$